Calendar No. 649

97TH CONGRESS, 2d Session } SENATE { REPORT No. 97-457

AUTHORIZING APPROPRIATIONS FOR THE NATIONAL SCIENCE FOUNDATION FOR FISCAL YEAR 1983

MAY 28, 1982.—Ordered to be printed
Filed under authority of the order of the Senate of May 12 (legislative day, May 11), 1982

Mr. HATCH, from the Committee on Labor and Human Resources, submitted the following

REPORT

[To accompany S. 2349]

The Committee on Labor and Human Resources, to which was referred the bill S. 2349, to authorize appropriations for the National Science Foundation for fiscal year 1983 and for other purposes, having considered the same, reports favorably thereon with an amendment and recommends that the bill as amended do pass.

I. BRIEF SUMMARY

The bill authorizes appropriations for the National Science Foundation for fiscal year 1983 in the following categories and amounts:

Mathematical and physical sciences	$298,700,000
Engineering	99,700,000
Biological, behavioral and social sciences	191,700,000
Astronomical, atmospheric, Earth and ocean sciences	259,700,000
Ocean drilling programs	14,000,000
Antarctic research programs	86,400,000
Scientific, technological, and international affairs	44,000,000
Program development and management	63,081,000
Science and engineering education	25,000,000
Special foreign currency	2,200,000
Total	1,084,481,000

II. SECTION-BY-SECTION SUMMARY

Section 2

This section designates recommended funding levels for all NSF research and education activities for fiscal year 1983.

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A set-aside of $2 million from funds authorized for the Engineering Directorate was provided for the program, Science and Technology to Aid the Handicapped.

A set-aside of $34,500,000 from funds authorized for the Biological, Behavioral and Social Science Directorate was provided for subactivities in the cognitive sciences, anthropology, social and economic sciences.

Section 3

This section stipulates that appropriations made for research, education and special foreign currency can be obligated throughout the period specified in the appropriations act.

Section 4

This provision limits the amount which can be spent on official consultation, representation, etc., to $2,500. Such expenditures can be made only at the discretion of the Director.

Section 5

This section authorizes NSF to draw $2,200,000 in foreign currencies for NSF expenses incurred outside of the United States.

Section 6

This section authorizes the Foundation to transfer funds from any one category to another as long as the amount is not greater than 10 percent of the authorization for the first category. If the proposed transfer is in excess of 10 percent, the Director must notify Congress and can effect the transfer only if there is no objection.

Section 7

This section makes several amendments to the National Science Foundation Act of 1950.

The National Science Board is mandated to provide a periodic report on the indicators of science and technology.

The Board is authorized to establish special commissions to study and make recommendations to the Foundation on particular issues in science research and education.

A provision of Public Law 95–99 (Section 6) mandating the establishment of a Resource Center for Science and Engineering at an educational institution, which had become permanently codified in the U.S. Code, was repealed.

A provision of Public Law 95–99 (Section 10) establishing financial disclosure and conflict of interest reporting for NSF employees duplicative of requirements in the Ethics in Government Act and in NSF regulations, was repealed.

A provision of the National Science Foundation Act of 1950 (Section 12(b)) which prevented any NSF employee from holding a patent on any invention which relates to the subject matter of his or her assigned duties at NSF, was repealed.

The National Science Board Special Commission on Pre-College Education in Science, Mathematics and Technology is required to submit its interim and final reports concurrently to the Congressional committees of jurisdiction as well as to the Foundation.

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III. Hearing

A public hearing was held on April 15, 1982 by the full Committee on Labor and Human Resources. The following individuals appeared to present testimony and respond to questions:

Dr. John B. Slaughter, Director, National Science Foundation.

Dr. Donald Langenberg, Deputy Director, National Science Foundation.

Dr. Lewis M. Branscomb, Chairman, National Science Board and Vice President and Chief Scientist, IBM Corporation.

Dr. F. James Rutherford, Chief Education Officer, Office of Science and Technology Education, American Association for the Advancement of Science.

Mrs. Sarah Klein, President, National Science Teachers Association and science teacher, Roton Middle School, Norwich, Connecticut.

Dr. Lewis S. Salter, for the Independent Colleges and President of Wabash College, Crawfordsville, Indiana.

Dr. John E. Gibson, on behalf of the Council of Graduate Schools in the U.S. and Commonwealth Professor and Dean of the School of Applied Science and Engineering, University of Virginia, Charlottesville.

Dr. Anne M. Briscoe, on behalf of the Association of Women in Science and Director of the Biochemistry Laboratory, Harlem Hospital Center, Columbia University, New York City.

Dr. E. Margaret Burbidge, President, American Association for the Advancement of Science and Director of the Center for Astrophysics, University of California, LaJolla.

Dr. F. Thomas Juster, on behalf of the Consortium for Social Science Associations and Director of the Institute for Social Research, University of Michigan, Ann Arbor.

Dr. William S. Partridge, President, University of Utah Research Institute, Salt Lake City.

Dr. Laurence Berlowitz, on behalf of the Association of American Universities and Provost, Clark University, Wooster, Massachusetts.

Dr. Robert Parry, President, American Chemical Society and Distinguished Professor of Chemistry, University of Utah, Salt Lake City.

Additional statements were received for the record from the following:

Dr. John Wright, on behalf of a consortium of higher education organizations and President, University of Alabama, Huntsville.

Dr. Arthur C. Gentile, Executive Director, American Institute of Biological Sciences.

Association of American Colleges.

National Council of Teachers of Mathematics.

American Education Research Association.

American Association of Physics Teachers.

IV. NSF Functions and Mandate

The National Science Foundation (NSF) is an independent Federal agency established by the National Science Foundation Act of 1950 to promote and advance scientific progress in the United States. NSF

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occupies a unique place among Federal Government agencies, with responsibility for the overall health and science instead of research directed to specific missions.

NSF support for research and science and engineering education is provided through grants, contracts, and other agreements awarded to more than 2,000 universities, university consortia, nonprofit, and other research institutions. NSF encourages cooperative efforts by universities, industries, and government, but operates no in-house laboratories of its own. The Foundation accounts for more than 28 percent of Federal support for basic research going to academic institutions.

More than 30,000 scientists, engineers, and science educators assist NSF in determining the quality of research proposals each year. NSF staff members who are experts in science, engineering, or science education make award decisions on the more than 27,000 proposals received annually. Applicants can appeal award decisions.

A 25-member National Science Board establishes policies for the National Science Foundation within the framework of applicable policies made by the President and the Congress. The Board, the Director of the Foundation, the Deputy Director, and four of seven Assistant Directors are appointed by the President with the advice and consent of the Senate.

The Federal Government recognizes the support of research in all fields of science and engineering is important in maintaining the strength and well-being of the Nation. Research discoveries underlie advances in many important areas of Federal responsibility including national defense, industrial productivity, health, energy, environment and agriculture.

V. Program Description and Committee Views

The Committee recommends $1,084,481,000 for the National Science Foundation for fiscal year 1983. This figure is $15,000,000 above the Administration's FY 1983 budget request and $88,241,000 above the current FY 1982 plan. The Committee recommendation is an 8.8 percent increase over the current plan and represents real growth of about 2.3 percent, assuming an annual inflation rate of 6.5 percent.

Increases over the Administration's budget were made in only two NSF directorates: Biological, Behavioral and Social Science and Science and Engineering Education of $5 million and $10 million respectively. A more thorough discussion of NSF programs with Committee views follows.

MATHEMATICAL AND PHYSICAL SCIENCES (MPS)

The objective of the Mathematical and Physical Sciences (MPS) activity is to increase fundamental understanding of the physical laws that govern the world and the universe in which we live. To achieve this objective, MPS uses a wide range of research support modes, including individual or group research projects, special instrumentation grants, university research laboratories and national user facilities, while supporting research across a spectrum of disciplines and scientific specialties. Support is provided for research in mathematics, computer science, physics, chemistry, and materials research.

The Committee supports the FY 1983 budget request for this activity of $298.7 million, an increase of $25.8 million or 9.5 percent above the Current Plan for FY 1982 of $272.9 million.

At this request level, previous emphasis on experimental computer science research, including planned support for approximately twelve computer research facilities is permitted, as well as support for detector and storage ring improvements at the Cornell Electron Storage Ring, installation of a "cooler" storage ring at the Indiana University Cyclotron, construction of the Phase II Michigan State University heavy ion accelerator, and an increase of about 8 percent in the average grant.

ENGINEERING (ENG)

The goals of the Engineering activity are to (i) advance fundamental knowledge of engineering principles that can be applied to the analysis and design of man-made devices, systems and processes; (ii) focus research attention in areas relevant to selected national problems; and (iii) strengthen the infrastructure of the engineering research community. While this activity provides some support for selected research facilities, it primarily funds individual research projects, including a special research initiation program for young investigators. It also works in close cooperation with the University/Industry Cooperative Research program supported under the Scientific, Technological and International Affairs (STIA) activity.

The Committee recommends $99.7 million for this activity, an increase of $8.9 million or 9.8 percent more than the 1982 Current Plan of $90.8 million (exclusive of $1.2 million for strong ground motion array data transferred to the U.S. Geological Survey in 1983).

This authorization allows research in microelectronics, work related to robotics, manufacturing, development of novel chemical and separation processes central to chemical process technology, geotechnical engineering, structural mechanics, water resources and environmental engineering. Earthquake research is maintained at about the 1982 level. Overall there will be a slight increase in the number of estimated awards to be made in 1983 with an estimated increase of about 6 percent in the average size of awards.

The Committee adopted an amendment proposed by Senator Randolph to restore a set-aside for the program, Science and Technology to Aid the Handicapped. Such a set-aside had previously been a part of regular NSF authorization bills and has accounted for several important inventions to assist handicapped citizens. The amount recommended for this set-aside of funds from the Engineering Directorate is $2 million.

BIOLOGICAL, BEHAVIORAL AND SOCIAL SCIENCES (BBS)

The objective of this activity is to increase basic understanding of life forms and life processes through research in biology, environmental sciences, cognitive and neural sciences, and economic and social science. Such research has led to new important knowledge on such topics as living organisms, human memory and learning, economic forecasting, and productivity measurements.

The Committee recommends $191.7 million for this directorate, with a set-aside of $34.5 million for research in the behavioral eco-

nomic and social sciences. This is an increase of $5 million over the Administration request for the directorate which will be targeted to the behavioral economic and social science areas. While NS is still cautioned regarding the awarding of such funds to projects which could be construed as frivolous or value laden, the Committee believes the modest increase for basic research in these fields is warranted. Research programs in the behavioral economic and social sciences bore a disproportionate share of the budget cuts in fiscal year 1982, dropping support for these subactivities to levels below fiscal 1980. The increase suggested by the Committee still does not return support for the behavioral and social sciences to this level, but given recent developments of both an endogenous and exogenous nature, additional funding was believed merited.

First new emphasis is being placed on research that is either directly or indirectly related to productivity or capital formation. The ultimate benefits of such research will assist public and private planners to make choices with less uncertainty due to greater sophistication in the techniques for analysis. Second, international competitors in both the economic and political arenas are investing significantly more in behavioral, economic and social research recognizing the long-term pay-offs of new knowledge to efficiency in production, marketing, design and negotiation. West Germany, for example, has recently allocated $42 million to a program to determine the social and behavioral effects of job restructuring, and the Soviet Union is desirous of developing better survey research. Of recent interest to political analysts in the United States are the trends and effects of trade unions in other nations. While it is readily acknowledged that these fields of science must take their place among all NSF's priorities, making it impossible to fund the directorate at a higher level, the Committee has concluded that the economic, social and behavioral sciences should not be starved for adequate support and that a modest transfusion of funds was justified.

ASTRONOMICAL, ATMOSPHERIC, EARTH AND OCEAN SCIENCES (AAEO)

The objectives of the Astronomical, Atmospheric, Earth and Ocean Sciences activity are to (i) increase understanding of the physical nature of the universe; (ii) advance knowledge of the Earth's atmosphere; (iii) provide further insights into the physical and chemical composition of the Earth and its geologic history; (iv) improve knowledge of the world's oceans, and sea floor, and the living creatures they nurture; and (v) advance knowledge of natural phenomena in the Arctic. The activity provides support directly to individual investigators; it also supports major research facilities, including the National Center for Atmospheric Research and the National Astronomical Observatories.

The Committee supports the Administration's request of $259.7 million for this activity. This is an increase of $19.7 million or 8.2 percent over the FY 1982 Current Plan. The recommended amount will permit a special emphasis on research in Earth sciences, including a full-year seismic profiling program, extended support for instrumentation, and a thrust to increase our understanding of the structure and evolution of the continental crust. Additionally, this level of funding will pro-

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vide for the upgrading of ships and on-board scientific equipment of the academic fleet along with continuing support for basic research in oceanographic science. The recommendation assumes the maintenance of the number of individual awards granted in FY 1982 and an increase in the average size by 9 percent.

OCEAN DRILLING PROGRAMS (ODP)

The objective of the Ocean Drilling Program activity is to achieve an understanding of the detailed composition and behavior of the submerged portion of the earth's surface. It is an interdiciplinary science program which, since 1968, has supported a unique worldwide effort to explore the earth's crust beneath the oceans.

The Budget Request for this activity for fiscal year 1983 is $14.0 million, a decrease of $6.0 million or 30.0 percent from the fiscal year 1982 Current Plan of $20.0 million. The Committee supports this request. This request provides for continued operation of the drilling ship *Glomar Challenger* through fiscal year 1983, currently planned as the final year of the Deep Sea Drilling Project.

A decision will be made in the summer of 1982 on wheher to recommend the modification of the ship *Glomar Explorer* as a replacement for *Challenger*. If this is recommended, reprograming of about $9.0 million in fiscal year 1983 from other Foundation research activities would be required. In preparation for making that decision, scientific planning activities, along with cost and engineering studies on *Explorer* conversion, are underway. Discoveries in the deep oceans have led to remarkable advances in our understanding of the universe's development. The potential for untapped resources in our oceans can only be eventually realized through increases in knowledge. For this reason, this Committee commends the Deep Sea Drilling Program (DSDP) of the National Science Foundation and expects that similar increases in knowledge will result from he Advanced Ocean Drilling program (AOD). The AOD activity, an outgrowth of the now-defunct Ocean Margin Drilling Program, has as its cornerstone the conversion of the *Glomar Explorer*. It will be the platform from which do conduct the next generation of research in the world's oceans. This unique drilling platform could incorporate interests of scientists from numerouss disciplines. The Committee, therefore, encourages efforts to convert the *Glomar Explorer* for research purposes and retain the preeminent U.S. position in deep oceans research.

The Ocean Margin Drilling program was terminated in October, 1981, partly because of changes in the Federal budget outlook, and partly because of the Foundation's inability to obtain an oil industry-wide agreement to support the activity jointly with the Foundation.

U.S. ANTARCTIC PROGRAM (USAP)

The National Science Foundation has been responsible for managing and funding the U.S. Antarctic Program since 1972. Both the President and the Congress have recognized that this responsibility is in addition to the usual activities of NSF. U.S. policy calls for the maintenance of an active, national presence in Antarctica.

The fiscal year 1983 recommendation for the U.S. Antarctic Program activity is $86.4 million. This total includes $13.4 million which

reflects a transfer of responsibility for icebreaker support to the NSF from the U.S. Coast Guard. This transfer represents a policy change to include the total, rather than incremental, operating costs of icebreakers in the budget requests of Federal agencies which employ such ships in program support.

Exclusive of this transfer, the increase for support of this activity is $7.0 million or 10.6 percent above the fiscal year 1982 Current Plan of $66.0 million. This increase in fiscal year 1983 will be used to expand support for climate, marine, geological and oceanographic research, provide for the increased costs of operations support, and replace obsolescent buildings and equipment, especially McMurdo Station.

SCIENTIFIC, TECHNOLOGICAL, AND INTERNATIONAL AFFAIRS (STIA)

The Scientific, Technological, and International Affairs activity supports and performs research and analysis to link performers of research with users of research (industry, small business, and State and local governments); exchange scientific and technical information internationally and facilitate international cooperation; serve science and technology decision makers and the public with policy-oriented data, information and analysis; and strengthen the science base by expanding opportunities for all qualified segments of the performing community to contribute to high quality research. STIA achieves these goals by supporting: joint research between universities and industry; small business innovation research; cooperative scientific activities with both advanced and developing countries; studies on the state of the research enterprise and its impact on the economy and society; and programs which contribute to development of the Nation's science and engineering infrastructure.

In FY 1982, a new subactivity, Coordinated Agency-Wide Reseach Activities (CARA) was budgeted under the STIA activity. Most of the program elements included in CARA were formerly displayed under Cross-Directorate Programs, which was discontinued as a separate activity in FY 1982. Programs included in the FY 1983 recommendation for this subactivity are the visiting professorships for women, a program of research improvement at minority institutions, and the minority research initiation program. The Committee is pleased that NSF is moving ahead with the implementation of the Equal Opportunities in Science and Technology Act and exhorts the Foundation to devote sufficient time and attention to these programs to insure their success.

The Committee recommendation for the entire STIA Directorate is $44 million, and is the same as the Administration's request. In addition to CARA, this amount will provide support for U.S. participation in international or bilateral research, work on the scientific instrumentation indicators, research by small, high technology firms, and additional university-industry cooperative research center, and liaison and information exchange functions to benefit state and local governments.

PROGRAM DEVELOPMENT AND MANAGEMENT (PD & M)

The Committee recommends $63.1 million for Program Development and Management, which is the unit of NSF which provides ad-

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ministrative support. This level of funding represents an increase of $400,000 from the Current Plan and a decrease of 63 full-time Foundation employees, or 5 percent.

The Committee level for FY 1983 includes personnel compensation and benefits at $44.6 million (a decrease of 1.3 percent below FY 1982), travel for staff, panelists, reviewers, and advisers (a decrease of 8 percent) and the purchase of additional data processing equipment (an increase of $300,000). Other support services will be maintained at current levels.

OTHER RESEARCH AND RELATED ACTIVITIES

As in fiscal year 1982, NSF support for several programs which are multidisciplinary is not programmed specifically within one or another directorate. Such programs are carried out with funds authorized for each directorate. In this connection, the Committee would like to make its intent clear regarding three special issues.

Instrumentation.—The problem of deteriorating and obsolescent instruments in university and college laboratories is growing worse. NSF has announced its intention to provide support for new instrumentation at large research universities and two and four year colleges in the amount of $109.2 million. The ramifications of the current situation are obvious: the accuracy of measurements and results is called into question, the time required to obtain and process data is lengthened, and students lack familiarity with state-of-the-art equipment having trained on decade-old instruments. It is clear that the cancer of inadequate and out-moded facilities and equipment is spreading and is a disease requiring much more than transfusions of federal funds. It is absolutely essential that the National Science Foundation not only carry out its plan to award grants for instrumentation to colleges and universities of all sizes and in all locations, but it must also take a leading role in searching for new and innovative ways to address this serious issue in American science policy.

Women and minorities.—While funds available for specific programs authorized by the Eqaul Opportunities in Science and Technology Act (PL 96–516) are greatly reduced and not directly allocated in S. 2349, the Committee directs the Foundation to carry out the spirit of the law in encouraging the submission of research proposals by qualified women and minority scientists and, in particular, to give careful consideration to those proposals which are from new Ph.D.'s or from scientists re-entering the field after a hiatus. The Committee is concerned that the intent of this program not be ignored in the absence of funds earmarked for such purposes. The pool of expertise in science and technology can be significantly increased by encouraging women and minorities to pursue careers in these fields and it must be an inherent policy of NSF to fund meritorious proposals of women and minority researchers and to assist in the career development of those who still face artificial barriers to participation in science.

Applied science.—The main mission of the National Science Foundation is, and will continue to be, basic research. NSF has always had, however, an important component for the conduct of applied research.

This component has in the past been both a separate directorate and a major function of the Engineering and Applied Science Directorate. Last year the applied science component was merged with other directorates by discipline. The Committee reiterates the concern expressed to the Foundation last year that promising applied research not become lost in the shuffle due to an abundance of excellent basic research proposals and limited resources.

SCIENCE AND ENGINEERING EDUCATION

The Committee approved an authorization of $25 million for Science and Engineering Education. This is an increase of $10 million above the Administration's request of $15 million.

The budget request submitted by the Foundation in this area was based on a continuance of graduate fellowship programs and the elimination of all pre-college and undergraduate programs, pending a long-range plan for science and mathematics education developed by a special commission established by the National Science Board. Following persistent criticism that NSF pre-college programs were too fragmented and unfocused to be effective, the National Science Board determined a comprehensive prospectus for future NSF efforts in this critical area was necessary.

The Committee supports the establishment of the Special Commission on Pre-College Education in Science, Mathematics and Technology and directs the Foundation to supply whatever resources are necessary in order that the Commission can function smoothly and execute its mission on a timely basis. For these purposes, and to demonstrate the extent of concern regarding American science education, the Committee singled out this new National Science Board Commission for special authorization. The Commission has a mandate to report to the Foundation and to the Congress by June 30, 1982 with appropriate interim reports.

The evidence of a growing problem is alarming. The Committee, therefore, directs the Commission to focus its work not on another redefinition or analysis of the problem, but rather on the development of a multi-year plan for a revitalized federal effort to improve science and mathematics education. The strong consensus of the Committee that such an effort begin with the fiscal year 1984 authorization demands that Congress be frequently updated on progress and possible recommendations. Therefore, the Committee requests the Foundation to prepare a report and plan of implementation for a new comprehensive science education program designed to address effectively the nation's needs for excellence in science, mathematics and engineering education. This report should consider the full continuum of education—precollege, undergraduate and graduate. It should also include consideration of precollege faculty development; instructional facilities and equipment; and research in science and mathematics education and undergraduate instruction. The report should be provided to the Committee by October 15, 1982.

The Committee has added $10 million for Science and Engineering Education activities in this bill, above the $15 million requested by the

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Foundation for graduate fellowships. While the Committee likewise places a high priority on the NSF Graduate Fellowships Program, it is expected that the additional funds might focus on improving our Nation's teaching resources in science and mathematics. The Committee has heard testimony describing the deterioration of our science educational system, particularly at the precollege level. We have heard about science teaching positions in our schools not being filled with qualified teachers, many of whom have little or no training in science. Many teachers who remain in the classroom are employing out-dated subject matter. As a result, this Committee places a high priority on teacher training activities at the precollege level, encouraging the NSF to reach back and utilize the rich experience it acquired from the sponsoring of teacher institutes a number of years ago.

In addition to precollege teacher training efforts and graduate fellowship support, the Committee places high priority on undergraduate research activities. Such activities are an important springboard for the significant number of graduates of 4-year, liberal arts institutions who continue their studies and receive the Ph.D., and are influential on campuses as a means of increasing scientific literacy and awareness of all students. This type of unique experience allows all students to better understand science and math by participating in research projects. The NSF is encouraged to seek creative approaches to utilize some of these funds for supporting undergraduate research projects. Equally important is providing research opportunities for small college faculties.

This Committee has been a leader in advocating more opportunities for women and minorities in the sciences. We continue to be assured that the above programs would have substantial numbers of women and minorities as participants. To ensure continued focus on this most important concern, the Committee requests that some funds be devoted to Career Workshops to encourage broader participation of women and minorities in the sciences, mathematics, and engineering.

SPECIAL FOREIGN CURRENCY (SFC)

India and Pakistan are countries in which U.S.-owned foreign currencies are available "in excess" as determined by the Department of the Treasury. These funds (special foreign currency) must be used within these countries and may be used for cooperative scientific and engineering research projects (P.L. 83–480 as amended). The Foundation seeks to strengthen the U.S. research effort by supporting mutually beneficial research projects in geology, chemistry, atmospheric sciences, engineering, physics, astronomy, the life sciences, and the social sciences involving U.S. and counterpart scientists in these countries. Binational workshops are supported to identify specific areas of mutual research interest. In addition, this activity supports U.S. foreign policy initiatives by funding projects conducted under the Indo-U.S. Joint Commission. It awards travel grants to U.S. scientists for participation in important international scientific congresses, conferences, and symposia in India and Pakistan. The National Science Foundation is the executive agency for the U.S.-India Exchange of

Scientists agreement of 1966 and the signatory of a memorandum of understanding with the government of Pakistan.

For these duties, the Committee recommends $2.2 million which is a decrease of $2.4 million from the Current FY 1982 Plan.

COMPARISON OF NATIONAL SCIENCE FOUNDATION BUDGETS

[By fiscal years, in millions of dollars]

Activity	1980	1981 [1]	1982 current plan	Administration 1983 request	Committee recommendation
Mathematical and physical sciences	225.8	256.5	272.9	298.7	298.7
Engineering	[2]102.0	[2]86.3	92.0	99.7	99.7
Biological, behavioral and social sciences	166.0	185.6	176.0	186.7	191.7
Astronomical, Atmospheric, earth, and ocean sciences	271.2	236.3	240.0	259.7	259.7
Ocean drilling programs	19.4	22.0	20.0	14.0	14.0
U.S. Antarctic program	55.5	67.5	66.0	86.4	86.4
Scientific technological, and international affairs	26.1	53.8	40.3	44.0	44.0
Program development and management	60.6	59.2	63.5	63.0	63.0
Science and engineering education	73.2	70.7	20.9	15.0	25.0
Special foreign currency	5.5	5.0	3.1	2.2	2.2
Cross-directorate programs	19.5	0	0	0	0
Total	970.8	1,022.7	993.7	1,069.5	1,084.5

[1] Fiscal year 1981 figures reflect program budgets after March 1981 rescissions.
[2] Figures include funds for applied science research.

VI. Budget Analysis

U.S. Congress,
Congressional Budget Office,
Washington, D.C., May 10, 1982.

Hon. Orrin G. Hatch,
Chairman, Committee on Labor and Human Resources,
U.S. Senate, Dirksen Senate Office Building, Washington, D.C.

Dear Mr. Chairman: Pursuant to Section 403 of the Congressional Budget Act of 1974, the Congressional Budget Office has prepared the attached cost estimate for S. 2349, the National Science Foundation Authorization Act for Fiscal Year 1983.

Should the Committee so desire, we would be pleased to provide further details on this estimate.

Sincerely,

Alice M. Rivlin, *Director.*

CONGRESSIONAL BUDGET OFFICE—COST ESTIMATE

1. Bill number: S. 2349.

2. Bill title: National Science Foundation Authorization Act for Fiscal Year 1983.

3. Bill status: As ordered reported by the Senate Committee on Labor and Human Resources, April 27, 1982.

4. Bill purpose: The bill authorizes the appropriation to the National Science Foundation of $1,084 million for fiscal year 1983. Of this amount, $1,057 million is authorized for research and related activities programs, $25 million is authorized for science and engineering education programs, and $2 million is authorized for the special foreign

currencies program. The bill also earmarks funds for research to aid the handicapped and for research in the economic, behavioral, and social sciences.

Additionally, S. 2349 permits the transferral of funds among certain programs, provides that the National Science Board make periodic reports to the President, establishes new guidelines for special commissions, eliminates the NSF Resource Center for Science and Engineering, repeals the provisions of the NSF Act of 1950 prohibiting employees from holding patents resulting from NSF-related work, deletes the section of the NSF Authorization Act of Fiscal Year 1978 regarding employee financial disclosures, and authorizes the National Science Board to establish a Special Commission on Pre-College Education in Science, Mathematics, and Technology.

The $1,084 authorized represents an increase of $15 million over the President's request for fiscal year 1983, excluding the President's request for the Minority Institutions Science Improvement Program, which was proposed to be transferred from the Department of Education. This difference results mostly from an increase of $10 million for science and engineering education activities relative to the President's request.

5. Cost estimate:

	Millions
Authorization level:	
Fiscal year:	
1983	$1,084
1984	------
1985	------
1986	------
1987	------
Estimated outlays:	
Fiscal year:	
1983	564
1984	365
1985	95
1986	60
1987	-----

Including outlays from prior years' appropriations, total 1983 outlays are estimated to be $987 million, assuming appropriation of the authorized amount.

The costs of this bill fall within budget function 250.

6. Basis of estimate: For the purposes of this estimate, it is assumed that the full amount authorized for fiscal year 1983 is appropriated. It is also assumed that the distribution of funds among NSF programs as stated in the bill is maintained. The estimate of annual outlays is based on historical spending patterns for NSF programs.

7. Estimate comparison: None.

8. Previous CBO estimate: On April 21, 1982, CBO prepared a cost estimate for H.R. 5842, the National Science Foundation Authorization Act for Fiscal Years 1982 and 1983, as ordered reported by the House Committee on Science and Technology. That bill differed from S. 2349 in authorizing funds for fiscal year 1982 above that already appropriated, and in authorizing an appropriation for the NSF in fiscal year 1983 of $1,099 million, or $15 million more than

S. 2349. H.R. 5842 also provided a specific amount for modernizing research equipment and facilities and allowed withdrawal of funds from the International Institute for Applied Systems Analysis upon notification by the President that participation is contrary to national security interests.

9. Estimate prepared by: Steve Martin (226–2860).

10. Estimate approved by:

C. G. NUCKOLS

(For James L. Blum, Assistant Director for Budget Analysis.).

VII. REGULATORY IMPACT

This measure represents a one year extension of existing NSF programs and activities and proposes specific levels of funding. There is no additional regulation anticipated as a result of enactment of this legislation.

VIII. COMMITTEE ACTION

By voice vote, the Committee adopted an amendment offered by the Chairman on behalf of Mr. Randolph to provide a $2 million set-aside of funds within the Engineering Directorate for the program, Science and Technology to Aid the Handicapped.

On a recorded vote, the Committee rejected an amendment by Mr. Kennedy to increase funding for the Science and Engineering Education Directorate by $20 million. The roll-call vote was as follows:

YEAS	NAYS
Mr. Kennedy	Mr. Hatch
Mr. Pell	Mr. Quayle
Mr. Eagleton	Mrs. Hawkins
Mr. Randolph (by proxy)	Mr. Nickles
Mr. Riegle (by proxy)	Mr. Weicker
Mr. Metzenbaum (by proxy)	Mr. Denton
Mr. Matsunaga (by proxy)	Mr. Stafford (by proxy)
	Mr. Humphrey (by proxy)
	Mr. East (by proxy)

By voice vote, the Committee subsequently agreed to an amendment by the Chairman which increases the Science and Engineering Education Directorate by $10 million.

By voice vote, the Committee agreed to an amendment proposed by Mr. Kennedy to increase the Biological, Behavioral and Social Science Directorate by $5 million, earmarked for research in the behavioral, economic and social sciences.

By voice vote, the Committee agreed to delete the line item for the Minority Institutions Science Improvement Program. This program was previously authorized in the Omnibus Reconciliation Act of 1981.

By voice vote, the Committee agreed to an amendment offered by the Chairman to authorize the Special Commission on Pre-College Education in Science, Mathematics and Technology.

On a recorded vote, the Committee ordered S. 2349 reported as amended. The roll-call vote was as follows:

YEAS	NAYS
Mr. Hatch	Mr. Humphrey (by proxy)
Mr. Quayle	
Mrs. Hawkins	
Mr. Nickles	
Mr. Weicker	
Mr. Denton	
Mr. Kennedy	
Mr. Pell	
Mr. Eagleton	
Mr. Stafford (by proxy)	
Mr. East (by proxy)	
Mr. Randolph (by proxy)	
Mr. Riegle (by proxy)	
Mr. Metzenbaum (by proxy)	
Mr. Matsunaga (by proxy)	

I. Changes to Existing Law

National Science Foundation Act of 1950

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NATIONAL SCIENCE BOARD (42 U.S.C. § 1863)

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SEC. 4 [(j) The Board shall render an annual report to the President, for submission to the Congress on or before March 31 in each year. Such policy report shall deal essentially, though not necessarily exclusively, with policy issues or matters which affect the Foundation or with which the Board in its official role as the policymaking body of the Foundation is concerned.]

(j)(1) The Board shall periodically render to the President, for submission to the Congress, a report on indicators of the state of science and engineering in the United States.

"(2) The Board shall render to the President, for submission to the Congress, reports on policy matters related to research and education in science and engineering, as the Board, the President, or Congress determines the need for such reports.".

* * * * * * *

[SPECIAL COMMISSIONS (42 U.S.C. § 1868

[SEC. 9. (a) Each special commission established pursuant to section 4(h) shall consist of eleven members appointed by the Board, six of whom shall be eminent scientists and five of whom shall be persons other than scientists. Each special commission shall choose its own chairman and vice chairman.

[(b) It shall be the duty of each such special commission to make a comprehensive survey of research, both public and private, being carried on in its field, and to formulate and recommend to the Foundation at the earliest practicable date an overall research program in its field.]

"*SPECIAL COMMISSIONS*

"*SEC. 9. (a) Each special commission established under section 4(h) shall be appointed by the Board and shall consist of such members as the Board considers appropriate.*

"*(b) Special commissions may be established to study and make recommendations to the Foundation on issues relating to research and education in science and engineering.*".

NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT FOR FISCAL YEAR 1978 (PL 95-99)

* * * * * * *

[SEC. 6. (a) The National Science Foundation shall establish a Resource Center for Science and Engineering to be located at an educational institution which—

[(1) enrolls substantial numbers of minority students, students from low-income families, or both;

[(2) is geographically located near one or more population centers of low-income families or minority groups;

[(3) demonstrates a commitment to encouraging and assisting minority students or students from low-income families, or both; and

[(4) has an existing or developing capacity to offer doctoral programs in science and engineering.

[(b) The Center established under this section shall—

[(1) support basic research and the acquisition of necessary research facilities and equipment;

[(2) serve as a regional resource in science and engineering for the community which the Center serves; and

[(3) develop joint educational programs with nearby pre-college and undergraduate institutions which enroll a substantial number of minority students or students from low-income families.] *repealed.*

[SEC. 10. (a)(1) Each officer or employee of the National Science Foundation who performs a decisionmaking function in the handling of any application or proposal for a grant from or contract with the Foundation shall provide a written statement for the record identifying (in accordance with the standards promulgated under subsection (b)) any financial interest or other relevant interest he or she has in the person submitting the application or proposal and any academic affiliation he or she has with that person. If the application or proposal results in an award, the statement shall be made available to the public.

[(2) The Director shall remove or take other appropriate disciplinary action against any employee who knowingly violates the requirements of this subsection.

[(b)(1) Within 60 days after the date of the enactment of this Act, the Director of the National Science Foundation shall publish—

[(A) proposed standards to implement the requirements of subsection (a), designed to minimize conflicts of interest and to assure that the appropriate files of the Foundation relating to any grant or contract referred to in such subsection contain a statement of any financial or other relevant interest which any of the

officers and employees involved may have in the person or institution applying for or proposing the grant or contract as well as any academic affiliation which any of such officers and employees may have with such person or institution; and

[(B) proposed standards appropriately requiring identification of any conflicts of interest by peer reviewers.

[(2) Within 120 days after the date of the enactment of this Act, the Director shall promulgate the standards published under paragraph (1), with such modifications as the Director may deem appropriate; and such standards shall take effect upon their promulgation.

[(c) The Director shall report annually to the Congress on the administration and enforcement of this section.

[(d) If the President issues an Executive order that requires financial disclosure by officers and employees of Federal agencies generally, only so much of this section as relates to peer reviewers and to academic affiliations of officers and employees shall remain effective.] *repealed.*

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